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MAY 29 2001
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APPLICATION FOR LETTERS PATENT OF THE UNITED STATES

SPECIFICATION

To all whom it may concern:

Be It Known, That we, **Michael Waller** and **Matthew A. Ward**, of London, UK and London, UK; respectively, have invented certain new and useful improvements in **ACCESS TO INFORMATION NETWORKS BY MOBILE DEVICES**, of which we declare the following to be a full, clear and exact description:

OIPE JC47
MAY 2 9 2001
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ACCESS TO INFORMATION NETWORKS BY MOBILE DEVICES

Background of the Invention

This invention relates to access to information networks, notably the Internet or an intranet, by mobile devices, for example mobile telephones, hand-held computers and other suitably-enabled wireless communications devices for business partners to exchange information.

The background to the invention is the expansion of the Internet into mobile personal communications, for example by virtue of the Wireless Application Protocol (WAP) that is generating a proliferation of portable Internet-enabled devices. This technology is currently embodied in discrete hand-portable devices such as mobile telephones, palmtop computers and electronic personal organizers. However, it is to be expected that future communications devices will integrate more functions into a single unit such as a personal digital assistant, become smaller, be dispersed about the user's body or be constituted in wearable form such as a wristwatch, a pair of spectacles or even as part of a user's clothing. Increasingly, therefore, having mobile communications devices about one's person will become as much a part of everyday life as wearing a pair of shoes.

Change is also being seen in the ways in which information is presented to the user. As users come to terms with the mass of information that is available online, particular efforts are being made to filter irrelevant or otherwise unwanted information and moreover to personalize the information that is presented to the user. The aim is to foresee the user's information needs by reacting to the user's browsing activity, for example by referring to records of the user's past browsing habits. A particular example of this tailoring of information is in the presentation of 'click-through' or 'banner' advertising, and more generally in the presentation of links that relate to the subject of the web page that the user is viewing or searching for.

Despite the seemingly boundless possibilities of the Internet, it does a disservice to the portability and sheer utility of mobile communications devices that they should be fed much the same diet of information as is presented to a static terminal.

Many of the varying experiences of day-to-day life relate to one's changing geographical location and especially the things that one sees, hears and experiences when at those different locations. As different experiences create different information needs, it follows that one's information needs also vary with geographical location. The faster a user travels and the more places the user visits, the greater the need for responsiveness in the information supply technologies upon which the user relies. Here, existing technologies fail to cope.

Summary of the Invention

By way of illustration, imagine that a user of a WAP-enabled device such as a mobile telephone is a tourist riding on a sightseeing tour bus around London. That user sees a sight of particular interest, for example the National Gallery, and wants to know more about it. Using the WAP telephone, the user launches a browser, accesses the Internet, conducts a search using a suitable search engine and eventually (signal permitting) accesses the National Gallery's website. By this time, however, the bus has moved on past other tourist attractions, which the user has missed while browsing the Internet, and has reached another attraction that also interests the user and so makes the National Gallery information redundant. The user has also missed the fact that had he or she looked in the opposite direction when looking at the National Gallery, there would have been a good view of Trafalgar Square and Nelson's Column. These attractions could well have been more interesting to the user than the National Gallery ever was.

It will be apparent from scenarios such as this that existing technologies fail to satisfy a user's changing real-time information needs as he or she moves from place to place in daily life. The problem is not one of miniaturization, access speed or some other hardware issue: it is about a more fundamental difficulty with the way in which information is selected from the Internet for supply to a mobile user of a portable Internet-access device. To treat that device as merely a portable version of a static terminal is to deny possibilities that are unique to mobile devices, particularly their potential to respond to and to support a mobile user's changing information needs.

Another way in which existing mobile communications devices fail to achieve their potential is in the creation of a personalized space around the user. Static browsing terminals such as home PCs have increasingly large, high-definition displays and high-quality sound facilities that are designed to immerse the user in a virtual environment of their own making. Apart from enabling the user to enjoy a rich multi-sensory experience in the subject of interest, a user thus engaged is an excellent target for advertising.

Existing mobile communications devices cannot compete with this level of user involvement. This is partly due to limitations of display size and so on, but is largely because existing mobile communications devices try to emulate a static terminal rather than using the potential of mobility and portability to create new and advantageous communications concepts.

The present invention resides in the insight that a mobile and preferably hand-portable device communicating with an information network can tailor the information it presents to a user in accordance with its geographical position and optionally also its orientation, direction, altitude and/or other inputs such as the time of day. More generally, the device and the information network are parts of a system and provided that the position, orientation and so on are known to the system as a whole, either by independently determining the position of the device or by receiving spatial data from the device, the information can be tailored by parts of the system other than the device itself. However, it is simpler that the device calls for the information it deems necessary from the information network, with reference to self-measured spatial data.

The information thus presented to the user may be thought of as tailored spatial information. In the Internet context, the information would be expressed as spatial web pages or spatial URLs defined by (i) the quadrant or location in which the user and the associated communications device are located and (ii) the URL channel. An optional further defining factor is (iii) the orientation or direction of the user and the associated device. Once the device has this spatial data comprising its location and optionally also its orientation, it can be configured automatically to open a spatially-specific URL.

The web page thus accessed can relate in several beneficial ways to the location/orientation of the user and hence to whatever the user might be doing at that location. In this way, the invention brings value to the user and to businesses who supply the user, or would like to do so. The invention contemplates the creation of spatial URL channels that underpin numerous facilities such as branded space, the opportunity for e-business to have spatial real estate, a practically infinite number of web channels located in the same place, educational spatial information, entertainment information systems, signage, billboards and advertising, and live transportation signage.

There are various ways in which a communications device can know its position and hence tailor the information it presents accordingly. At the most basic level, the user can tell the device where it is, assuming of course that the user knows this information, and the device can respond to this input in a pre-determined way by, for example, selecting web pages relevant to that location. Preferably, however, the user is taken out of the locating process so that the device calculates its own location using the geostationary satellite network of the Global Positioning System (GPS) or by radio-triangulation of communications signals received by the device. For example, from 2002, the United States government will be enforcing a positioning system for mobile telephone users through triangulation from the transmitters that serve those telephones. The primary purpose of this system is to enable emergency services to locate and assist mobile telephone users who do not know their location, but the invention provides an alternative and beneficial use of this infrastructure.

Location by means such as triangulation can be performed either by the communications device itself or by the system that transmits to the device. If the latter, the resulting location can be transmitted to the device or can be used independently to tailor the information that is made available to the device or that is sent to the device.

GPS and triangulation methods enable location in three dimensions, and so allow a device automatically to calculate its altitude or elevation above sea level, or indeed its depth, if underwater.

Again, orientation could be input by a user (if the user knows the orientation) or could be calculated by triangulation techniques, but it is best derived automatically from a bearing

signal generated by an electronic compass within the device. A time signal, if required, will generally be available inherently within the device.

Accordingly, the invention can be described as a method of accessing information on an information network accessible by a mobile communications device, comprising determining the location of the device and tailoring the information supplied to a user in accordance with that location. The invention extends to a mobile communications device for accessing information on an information network, the device comprising means for determining its location for use in tailoring the information supplied to a user in accordance with that location.

In this specification, 'location' is intended to mean the position of the user, and the hence the position of a communications device carried by the user, on such a scale that the position varies in ordinary day-to-day life, for example upon travelling along a street within a city, rather than merely being in a particular country or in a region of that country.

It should also be understood that the term 'information network' is this specification is intended to include the Internet, an intranet and an extranet. An extranet is essentially an intranet that is partially accessible to authorized outsiders. Whereas an intranet resides behind a firewall and is accessible only to people who are members of the same company or organization, an extranet provides various levels of accessibility to outsiders. You can access an extranet only if you have a valid username and password, and your identity determines which parts of the extranet you can view. Extranets are becoming a very popular means for business partners to exchange information.

Some optional features have been set out above. Others will be evident from the appended claims.

Brief Description of the Drawings

In order that the invention can be more readily understood, reference will now be made, by way of example, to the accompanying drawings in which:

Figure 1 is a schematic plan view of a user equipped with a web-enabled communications device in accordance with the invention, the user being in a spatial quadrant

defined by GPS or by radio triangulation, and showing how different URLs can be accessed simply by changing orientation of the device while in that quadrant;

Figure 2 is a sketch of a communications device of the invention being used to overlay visual information on a building visible along a particular bearing from the spatial quadrant in which the device is situated; and

Figure 3 is a sketch of another communications device of the invention being used to present sound information about a building visible along a particular bearing from the spatial quadrant in which the device is situated.

Detailed Description

Referring firstly to Figure 1 of the drawings, a user 10 holding a web-enabled mobile communications device 12 is located within a spatial region 14 or cell defined by the positional resolution of a GPS system or radio triangulation system. The resolution of GPS and hence the diameter of the region 14 in which the user is known to be located is in the region of 30 meters. The corresponding figure for radio triangulation is in the region of 100 meters.

The device 12 uses GPS or radio triangulation to determine its approximate position within the above-mentioned tolerances, thereby to identify the region 14 in which it is located. The device 12 also has an integral electronic compass (not shown) to determine its orientation within that region 14, for example facing north as shown in the illustration. It will be understood that any specified orientation involves the user 10 facing the direction of orientation with the device 12 held straight in the natural reading position in front of the user 10, like a compass or a book.

Thus, when located in the region 14 and held by the user 10 as shown in Figure 1, the device 12 knows that it is in region 14 and that it is pointing north. Means responsive to that position and orientation launch browser functionality within the device 12 to download and display a web page located at a first URL, namely URL-1, that is associated with the northerly orientation. Thus, for example, if a particular attraction such as a cathedral is visible to the north of region 14, URL-1 is suitably a website relating to that attraction.

In the example shown in Figure 1, there are eight URLs (URL-1 to URL-8) each associated with a respective one of the points of the compass (N, E, S, W) and the intermediate headings between them (NE, SE, SW and NW). There could of course be more or less than eight URLs. Thus, as the user 10 turns within region 14 and so changes the orientation of the device 12, each respective URL is accessed and the related web page displayed. So if, for example, a particular mountain can be seen on the south-west horizon when viewed from region 14, a website at URL-6 could be downloaded and displayed to tell the user about the rock-climbing opportunities there.

Used in this way, a device 12 such as a web-enabled mobile telephone or other similar device has a mobile 'point and push' facility, whereby the user can simply point and activate the device, which in turn downloads or stores a web page.

The device 12 can store a plurality of URLs in an on-board look-up table to be accessed at different locations and orientations as the user carries the device 12 around. However, for maximum flexibility, it is preferred that the choice of URL is determined wholly or partially by the system of which the device 12 is a part. Thus, for example, the device 12 makes its location known to an information network when requesting an information resource, and the network selects a resource or set of resources appropriate to both the location and the nature of the information requested.

So, preferred embodiments of the invention provide for layers of information channels at each region 14, each channel being directed to a different type of information that might be requested at a given location. In other words, much like web domains, two- or three-dimensional spaces can be divided into channels that provide particular categories of information pertinent to different users of that space. For example, in a city location, a 'tourist' channel can be used by tourists to obtain information on tourist attractions at or around that location, in the manner described previously. A 'pedestrian' channel can be used to tell pedestrians (whether tourists or not) about practicalities of pedestrian life at or around that location, such as the timetable of a local bus service or the menu of a local restaurant. A 'motorist' channel can be used by drivers passing through that location as an aid to navigation and parking.

To maximize its usefulness to different types of user 10, it is envisaged that a device 12 would have means for viewing, selecting and switching between whatever channels are available at a particular location. Once accessed by a user who specifies the channel of interest, each channel suitably provides a set of URLs selected in accordance with the orientation of the device 12 as before, although control elements such as a touch-screen overlay, buttons, keys, trackballs, joysticks and so on can be employed on the device to provide additional control of browser functionality.

Whilst it is possible for the device 12 to display information on a traditional display such as an opaque LCD screen, preferred embodiments of the invention employ a transparent LCD display on which the active pixels that form images are visible by virtue of their opacity. In this way, blank areas of the display can be left transparent to enable an attraction such as a building or object on an appropriate heading to be viewed through the display, with information on that attraction overlaid or shown juxtaposed to the visible image of it. Aside from the convenience and usefulness of this display technique, holding the device 12 with its display oriented to enable viewing in this way serves to orient the device 12 itself both accurately and reliably so as to access relevant information appropriate to that orientation.

An example of the use of a transparent display is shown in Figure 2, in which a user 10 holds a device 12 equipped with a transparent display 16 in that user's line of sight to an attraction 18, in this case the National Gallery in London. The display 16 overlays information identifying the attraction 18 and gives subsidiary information, in this case its opening hours. The displayed information could take the form of text, graphics or a three-dimensional object overlaid in space. With suitable earphone or speaker facilities, the displayed information can be supplemented by sound information.

It is also possible for sound information to take precedence over a visual display, as shown in Figure 3 where a device 12 held to the ear of a user 10 looking at an attraction 18 (in this case a theatre) plays a relevant sound file to the user 10. This sound file may, for example, be a review of a show due to take place at that theatre or some historical information about the theatre building itself.

As mentioned above, an important use of tailored information is in advertising. Similarly importantly, preferred embodiments of the invention provide for virtual advertisements giving advertisers the opportunity to advertise in physical spaces that can be viewed by or (with a transparent screen) through a device 12. In an Internet context, this creates a new form of spatial web real estate.

Thus, a company could have a virtual dynamic poster or billboard that is viewable by or through a device 12 when at a particular location, in addition to or instead of a physical advertising medium such as a poster or billboard at that location. It is even possible that when a transparent-screen device 12 is held up to view a physical advertising medium, the device modifies or adds to the advertising information already displayed on the physical medium. This can be used by an advertiser to increase the impact of the combined advertising message, or even to 'overwrite' the message of a competitor's physical advertising medium with the advertiser's own message.

More generally, this concept can be thought of as 'attaching' virtual objects to real objects, and has correspondingly general application. For example, a virtual object like a dynamic bus map could be attached to a physical bus stop timetable. This principle could be applied to many different objects and locations, and this type of association could relate to many different types of space. For instance, a narrative concerning a park space creates associations with its users, who may perhaps be interested in environmental conservation. The narrative could therefore contain links to various sources of information on environmental topics.

One possible objective of the invention is the creation of a virtual information 'kiosk' around the user's location, at which information pertinent to that location is brought to the fore against other such other information as may be available to the user. Unlike physical information kiosks, the virtual kiosk takes up no physical space, moves with the user, provides information that can be tailored by means of channels and so on to the user's preferences and needs, and in any event tailors itself to the user's adapting information requirements as the user moves around in physical space.

The invention also enables a user to make purchases on-line, for example by deducting electronic cash held by the device or by authorizing a transaction from the user's bank account. This may be in response to advertisements presented to the user by the device and can be triggered by a purchase command that is entered by the user or generated by the user's movements with the device. Thus, the invention contemplates charging for access through a virtual toll gate, enabling charges to be debited from the user if the user passes through a space or threshold while carrying the device. For example, going back to the National Gallery scenario of Figure 2, a user seeing the opening hours displayed on the device might decide to pay the gallery a visit. If the gallery charges for access, the user can be told there and then that an admission charge will be debited automatically if the user chooses to enter the gallery carrying the device. The user can then simply walk in, paying for entry without having to queue for a ticket.

In view of the positional coarseness of GPS and triangulation systems, the invention contemplates devices that firstly establish a way-point as a datum using GPS or triangulation to locate themselves, that optionally also use a compass bearing to determine their orientation, and then use technology such as an accelerometer to determine position more accurately by virtue of movements from that datum. Suitable accelerometers can track absolute position or the rate of change of position (i.e. velocity) and this data can be used as a further defining characteristic of the information that is accessed by the device. For example, the device need not be responsive only to orientation about a vertical axis in the sense of a compass bearing, but could also or alternatively be responsive to orientation about a horizontal axis so that information is tailored in accordance with the tilt of the device about that axis. Thus, a user looking upwardly through a transparent display of the device at something above the user would tend to tilt the device one way about the horizontal, whereas a user looking downwardly through the display at something below the user would tend to tilt the device the other way. Different information resources such as different URLs can be accessed as a result of these different orientations.

Aspects of the invention contemplate the development of a new computer language akin to HTML or XML but adapted to handle three-dimensional space. Thus, as a user

moves a device through physical space, he/she would move through a program written in the new language.

Users of devices according to the invention can interact and communicate with each other in novel ways. For example, a first user can use a device to deposit information tagged with a particular location as a marker, somewhat akin to a virtual footprint. This can be achieved by uploading the information from the device to an information network accessible by other devices, while leaving the marker as a tag that can be followed to the deposited information. That marker can then be seen and followed by a second user who comes to that location and views the marker through his or her own device, whereupon the marker can be activated or opened to retrieve the deposited information. It is similarly possible for a single user to deposit information at a particular location as a marker and to see and open the marker to access the deposited information upon returning to that location.

An extension of this concept is the creation of virtual objects, apparently positioned in physical space, that are left at a particular location for future access or reference by users of devices visiting that location. The virtual objects may thus provide information and services in the manner of a physical dispensing terminal like a vending machine or an ATM. These virtual objects can be branded like their physical counterparts so that a user's trust in and perception of the brand counteracts the lack of a physical presence in the virtual object.

By means of the invention, each user can visualize and enjoy a virtual environment such as a virtual streetscape, in which information resources and services are personalized and/or made relevant to the position of the user within the physical environment.

Many variations are possible within the inventive concept. An example mentioned briefly above is live transportation signage, in which the display of a device can act like a navigation system to give directions to a user. Another example mentioned briefly above is the presentation of educational information in an enjoyable and easy to use format.

Indeed, the invention can be embodied in numerous forms. Reference should therefore be made to conceptual statements herein such as the accompanying claims rather than to the foregoing specific description as indicating the scope of the invention.